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Jorge Henriques · Nuno Neves ·
Paulo de Carvalho
Editors

# XV Mediterranean Conference on Medical and Biological Engineering and Computing – MEDICON 2019

## Proceedings of MEDICON 2019, September 26–28, 2019, Coimbra, Portugal

Springer

*Editors*
Jorge Henriques
University of Coimbra
Coimbra, Portugal

Nuno Neves
Universidade do Minho
Braga, Portugal

Paulo de Carvalho
University of Coimbra
Coimbra, Portugal

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# Preface

MEDICON 2019 is the XV in the series of regional meetings of the International Federation of Medical and Biological Engineering (IFMBE) in the Mediterranean. MEDICON 2019 will be organized for the first time in Portugal and will be hosted by the UNESCO World Heritage University, the University of Coimbra.

The goal of MEDICON 2019 is to provide updated information on the state of the art on Medical and Biological Engineering and Computing under the main theme "**Patient empowerment**". Patient empowerment has emerged as a new paradigm that positions the patients at the heart of the health system and encourages them to be actively involved in managing their own healthcare needs. Effective patient empowerment requires a holistic approach, combining multiple dimensions of needs and patient contexts. Medical and Biological Engineering and Computing is a discipline at the heart of patient empowerment. Research and development in these areas are impacting the science and technology by advancing fundamental concepts in translational medicine and understanding in human physiology, function and behaviour at multiple levels. This is leading to improved tools and techniques for the detection, prevention, treatment and management of diseases. MEDICON 2019 provides a common platform for the cross fertilization of ideas and to help shape knowledge and scientific achievements by bridging complementary disciplines into an interactive and attractive forum under the special theme of the conference that is "improving health care through holistic patient empowerment".

The programme consists of some approximately 250 invited and submitted papers on new developments around the Conference theme, presented in 8 plenary sessions, 18 parallel scientific sessions and 19 special sessions and also includes a set of competitions and awards.

More specifically, the parallel scientific sessions cover the topics of biomedical signal processing; biomedical imaging and image processing; bio-instrumentation, bio-senso and bio-micro/nanotechnologies; bioinformatics, computational biology and systems biology; biomechanics, robotics and rehabilitation; therapeutic and diagnostic systems, devices and technologies and clinical engineering; information technology in health systems; assistive technologies; technologies for active ageing;

biomedical engineering education and society; clinical engineering and health technology assessment; neuroengineering, neurosystems; technologies for preventive health care; biomedical technologies for developing countries; standardization of open data; biomaterials and tissue engineering.

The special sessions include the topics of optimization in medicine and biology; ontological engineering in biomedical informatics; electronics and smart algorithms for the effective lung monitoring and COPD management; non-invasive temperature assessment using ultrasound; computational biology and medical applications; smartphone-based, patient-centred technologies; computational and experimental modelling for designing bone-implant systems; artificial organs: extracorporeal blood circulation medical devices; diabetes and cardiovascular diseases: Ibero-American trends; smart robotic assistant for minimally invasive surgery: the SMARTsurg project experience; intelligent computational systems in biomedical engineering; INT4DAT - Intelligent systems and technologies for diagnostic, assistance and therapeutics; upper limb exoskeletons for a better quality of life: what is real, what is useful, and what is next?; neurosystems and connectivity; therapeutic applications of imaging and neurostimulation; value-based health technology assessment; international collaborative on medical device assessment; ocular imaging; assessing human error in cognitive/intellectual demanding tasks: case study on software engineering.

The conference programme also includes three competitions and two awards: IFMBE Scientific Challenge competition; Fraunhofer Best Portuguese PhD thesis competition in Biomedical Engineering; Fraunhofer Best Portuguese MSc thesis competition in Biomedical Engineering; Best Student Paper Award; Young Investigator Competition Award.

Furthermore, the conference programme is highlighted by eight plenary sessions: Digitally empowered patients, presented by Aart van Halteren; Cardiovascular modelling and simulations—applications to some clinical studies, presented by Adélia Sequeira; Biomedical signals and images processing: towards innovative paradigms of information integration in the era of precision medicine and big data in health, presented by Sergio Cerutti; Multilingual dictionary of medical physics terms—update and relevance for clinical engineering, presented by Slavik Tabakov; Prevention Engineering: evolving challenges for biomedical and clinical engineering, presented by Luis Kun; Optical coherence tomography: a window into the mechanism of neurodegenerative disorders, presented by Rui Bernardes; Towards a value based healthcare system supported by process mining techniques, presented by Vicente Traver; In silico clinical trials: towards transforming the biomedical industry and the healthcare delivery, presented by Dimitrios Fotiadis.

Particular thanks are expressed to the kind support and effort of a number of external sponsors to which we would like to express our appreciation. Finally, a heartfelt thanks to all of you, the participants for your paper contributions, wishing you every success in your work at the conference. We hope that MEDICON 2019 will offer opportunities for professional growth and establishing new contacts with

fellow colleagues. Our intention is to do all we can to make your participation in MEDICON 2019 worthwhile and your stay in Coimbra enjoyable and memorable.

We hope you will appreciate this proceedings volume as much as we are proud of it!

September 2019

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**T9: Technologies for Active Ageing**

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**T10: Biomedical Engineering Education and Society**

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**T11: Clinical Engineering and Health Technology Assessment**

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**T12: Neuroengineering, Neurosystems**

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**SS06: Computational and Experimental Modelling for Designing Bone-Implant Systems**

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**SS10: Intelligent Computational Systems in Biomedical Engineering**

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**SS12: Upper Limb Exoskeletons for a Better Quality of Life: What Is Real, What is Useful, and What is Next?**

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### SS13: Neurosystems and Connectivity

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### SS14: Therapeutic Applications of Imaging and Neurostimulation

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### SS17: Ocular Imaging

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### SS18: Assessing Human Error in Cognitive/Intellectual Demanding Tasks: Case Study on Software Engineering

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